

WHAT IS CLAIMED IS:

1. A composition of matter comprising a single-wall carbon nanotube coated at least in part with at least one polymer molecule.

5 2. A composition of matter in accordance with claim 1, wherein the single-wall carbon nanotube is contacted by at least one polymer molecule at a plurality of points.

3. A composition of matter in accordance with claim 1, wherein the polymer is an amphiphilic polymer.

10 4. A composition of matter in accordance with claim 1, wherein the polymer is water soluble.

5 6. A composition of matter in accordance with claim 1, wherein the polymer is a surfactant.

7. A composition of matter in accordance with claim 1, wherein the electrical, mechanical, and thermal properties of said single-wall carbon nanotube are substantially the same as those of the single-wall carbon nanotube when uncoated.

8. A composition of matter in accordance with claim 1, wherein the carbon nanotube is coated with at least two different polymers.

9. A composition of matter in accordance with claim 1, wherein the polymer is a copolymer.

20 9. A composition of matter in accordance with claim 1, wherein said polymer is selected from the group consisting of: polyvinyl pyrrolidone (PVP), polystyrene sulfonate (PSS), poly(1-vinyl pyrrolidone-co-vinyl acetate) (PVP/VA), poly(1-vinyl pyrrolidone-coacrylic acid), poly(1-vinyl pyrrolidone-co-dimethylaminoethyl methacrylate), polyvinyl sulfate, poly(sodium styrene sulfonic acid-co-maleic acid), dextran, dextran sulfate, bovine serum albumin (BSA),
25 poly(methyl methacrylate-co-ethyl acrylate), polyvinyl alcohol, polyethylene glycol, polyallyl amine and mixtures thereof.

10. A composition of matter in accordance with claim 1, wherein the coated carbon nanotube is prepared by a process comprising dispersing a single-wall carbon nanotube and a

polymer in a solvent by a method selected from the group consisting of mixing, sonication, heating and combinations thereof.

11. A composition of matter in accordance with claim 10, wherein the coated carbon nanotube is prepared by a process further comprising adding salt in a quantity effective to promote wrapping of polymer on the single-wall carbon nanotube, whereby polymer becomes wrapped on the exterior of the carbon nanotube.

12. A composition of matter in accordance with claim 10, wherein the single-wall carbon nanotube is substantially free of amorphous carbon.

13. A composition of matter in accordance with claim 10, wherein the polymer and the single-wall carbon nanotube are added to the solvent sequentially.

14. A composition of matter in accordance with claim 10, wherein the polymer and the single-wall carbon nanotube are added to the solvent simultaneously.

15. A composition of matter in accordance with claim 10, wherein the solvent comprises water and the polymer is water-soluble.

16. A composition of matter in accordance with claim 15, wherein the solvent further comprises a surfactant that promotes wrapping of polymer on the carbon nanotube.

17. A composition of matter in accordance with claim 10, wherein the concentration of the single-wall carbon nanotubes in the solvent is between about 0.1 gram/liter and about 5 gram/liter.

18. A composition of matter in accordance with claim 10, wherein the concentration of the polymer in the solvent is between about 1.0 percent and about 5.0 percent by weight.

19. A composition of matter in accordance with claim 10, wherein the solvent is heated to a temperature at least about 40 °C.

20. A composition of matter in accordance with claim 10, wherein the solvent is heated in step (a) to a temperature between about 50 °C and about 60 °C.

21. A composition of matter in accordance with claim 10, wherein the solvent is heated between about 0.1 hours and about 100 hours.

22. A composition of matter in accordance with claim 10, wherein the solvent is heated between about 1 hour and about 50 hours.

5 23. A composition of matter in accordance with claim 1, wherein the coated carbon nanotube is encapsulated in a second polymer.

24. A composition of matter in accordance with claim 1, wherein the coated carbon nanotube is in a polymer matrix.

25. A composition of matter in accordance with claim 24, wherein the polymer matrix is selected from the group consisting of poly(methyl methacrylate), polystyrene, polypropylene, nylon, polycarbonate, polyolefin, polyethylene, polyester, polyimide, polyamide, epoxy, phenolic resin and combinations thereof.

26. A composition of matter comprising a plurality of single-wall carbon nanotubes each coated at least in part with a polymer molecule.

27. A composition of matter in accordance with claim 26, wherein each single-wall carbon nanotube of the plurality of single-wall carbon nanotubes is contacted by at least one polymer molecule at a plurality of points.

28. A composition of matter in accordance with claim 26, wherein the plurality of single-wall carbon nanotubes are substantially aligned along their longitudinal axes.

29. A composition of matter in accordance with claim 26, wherein the plurality of coated single-wall carbon nanotubes form an aggregate having an overall diameter less than about 10 nm.

30. A composition of matter in accordance with claim 26, wherein a first polymer molecule that coats a first single-wall carbon nanotube of the plurality of single-wall carbon nanotubes is cross-linked with a second polymer molecule that coats a second single-wall carbon nanotube of the plurality of single-wall carbon nanotubes.

31. A composition of matter in accordance with claim 26, wherein a first polymer molecule that coats a first single-wall carbon nanotube of the plurality of single-wall carbon nanotubes is cross-linked with a second polymer molecule that coats the first single-wall carbon nanotube of the plurality of single-wall carbon nanotubes.

32. A composition of matter in accordance with claim 26, wherein a first portion of a first polymer molecule that coats a first single-wall carbon nanotube of the plurality of single-wall carbon nanotubes is cross-linked with a second portion of the portion of the first polymer molecule.

33. A composition of matter in accordance with claim 26, wherein the plurality of coated single-wall carbon nanotubes are encapsulated in a second polymer.

34. A composition of matter in accordance with claim 26, wherein the plurality of coated single-wall carbon nanotubes are suspended in a polymer matrix.

35. A composition of matter in accordance with claim 26, wherein the polymer matrix is selected from the group consisting of poly(methyl methacrylate), polystyrene, polypropylene, nylon, polycarbonate, polyolefin, polyethylene, polyester, polyimide, polyamide, epoxy, phenolic resin and combinations thereof.

36. A composition of matter comprising an aggregate of uncoated single-wall carbon nanotubes wrapped with one or more polymers.

37. A composition of matter in accordance with claim 36, wherein the aggregate of uncoated single-wall carbon nanotubes comprises a rope of single-wall carbon nanotubes in which the nanotubes are substantially aligned along their longitudinal axes.

38. A composition of matter in accordance with claim 36, wherein the aggregate of uncoated single-wall carbon nanotubes comprises a bundle of single-wall carbon nanotubes in which the nanotubes are substantially aligned along their longitudinal axes.

39. A composition of matter in accordance with claim 36, wherein the polymer is an amphiphilic polymer.

40. A composition of matter in accordance with claim 36, wherein the polymer is water soluble

41. A composition of matter in accordance with claim 36, wherein said polymer is attached to the aggregate of the single-wall carbon nanotubes by non-covalent forces.

42. A composition of matter in accordance with claim 36, wherein the aggregate of single-wall carbon nanotubes is coated with at least two different polymers.

43. A composition of matter in accordance with claim 36, wherein the aggregate of single-wall carbon nanotubes is coated with a co-polymer.

44. A composition of matter in accordance with claim 36, wherein the polymer is selected from the group consisting of: polyvinyl pyrrolidone (PVP), polystyrene sulfonate (PSS), poly(1-vinyl pyrrolidone-co-vinyl acetate) (PVP/VA), poly(1-vinyl pyrrolidone-coacrylic acid), poly(1-vinyl pyrrolidone-co-dimethylaminoethyl methacrylate), polyvinyl sulfate, poly(sodium styrene sulfonic acid-co-maleic acid), dextran, dextran sulfate, bovine serum albumin (BSA), poly(methyl methacrylate-co-ethyl acrylate), polyvinyl alcohol, polyethylene glycol, and polyallyl amine.

45. A composition of matter in accordance with claim 36, wherein the polymer-coated aggregate of single-wall carbon nanotubes is prepared by a process comprising

dispersing the uncoated aggregates of single-wall carbon nanotubes and a polymer in a solvent by a method selected from the group consisting of mixing, sonication, heating and combinations thereof.

46. A composition of matter in accordance with claim 45, wherein the coated carbon
5 nanotube aggregates are prepared by a process further comprising adding salt in a quantity effective to promote wrapping of polymer on the aggregate of single-wall carbon nanotubes, whereby polymer becomes wrapped on the exterior of the aggregate of single-wall carbon nanotubes.

10 47. A composition of matter in accordance with claim 45, wherein the aggregate of single-wall carbon nanotubes are substantially free of amorphous carbon.

48. A composition of matter in accordance with claim 45, wherein the polymer is suspended in the solvent.

15 49. A composition of matter in accordance with claim 45, wherein the polymer and the uncoated aggregate of single-wall carbon nanotubes are added to the solvent sequentially.

50. A composition of matter in accordance with claim 45, wherein the polymer and the uncoated single-wall carbon nanotubes are added to the solvent simultaneously.

51. A composition of matter in accordance with claim 45, wherein the solvent is aqueous and the polymer is water-soluble.

20 52. A composition of matter in accordance with claim 51, wherein the solvent further comprises a surfactant that promotes wrapping of polymer on the aggregate of single-wall carbon nanotubes.

53. A composition of matter in accordance with claim 45, wherein the concentration of the aggregate of uncoated single-wall carbon nanotubes in the solvent is between about 0.1
25 grams/liter and about 5 grams/liter.

54. A composition of matter in accordance with claim 45, wherein the concentration of polymer in the solvent is between about 1.0 percent and about 5.0 percent by weight.

55. A composition of matter in accordance with claim 45, wherein the solvent is heated to a temperature at least about 40 °C.

56. A composition of matter in accordance with claim 45, wherein the solvent is heated to a temperature of between about 50 °C and about 60 °C.

5 57. A composition of matter in accordance with claim 45, wherein the solvent is heated between about 0.1 hours and about 100 hours.

58. A composition of matter in accordance with claim 45, wherein the solvent is heated between about 1 hour and about 50 hours.

59. A composition of matter in accordance with claim 45, wherein the coated aggregate of single-wall carbon nanotubes comprises carbon nanotubes which are substantially aligned along their longitudinal axes.

60. A composition of matter in accordance with claim 45, wherein a first polymer that coats the aggregate of the uncoated single-wall carbon nanotubes is cross-linked with a second polymer that coats a second aggregate of uncoated single-wall carbon nanotubes.

61. A composition of matter in accordance with claim 45, wherein a first polymer that coats the aggregate of the uncoated single-wall carbon nanotubes is cross-linked with a second polymer that coats the aggregate of the uncoated single-wall carbon nanotubes.

62. A composition of matter in accordance with claim 45, wherein a first portion of a first polymer that coats the aggregate of the uncoated single-wall carbon nanotubes is cross-linked with a second portion of the first polymer.

63. A composition of matter in accordance with claim 45, wherein the polymer-coated single-wall carbon nanotube aggregate is suspended in a polymer matrix.

64. A composition of matter in accordance with claim 63, wherein the polymer matrix comprises a material selected from the group consisting of poly(methyl methacrylate), polystyrene, polypropylene, nylon, polycarbonate, polyolefin, polyethylene, polyester, polyimide, polyamide, epoxy, phenolic resin and combinations thereof.

65. A composition of matter comprising a plurality of aggregates of single-wall carbon nanotubes wherein at least some aggregate of the plurality of aggregates is coated at least in part with at least one polymer molecule.